



## Beech: General information / Physical and technical properties

### General information:

**Scientific name:** *Fagus sylvatica L.*

**Common names:** German beech; European beech; English beech; Carpathian beech; Danish beech; French beech; Romanian beech;

**Common Uses:** Furniture, Cabinet making, Staircase construction, Mouldings, Flooring, Chairs, Decorative veneer, Desks, Baseboards, Joinery, Musical instruments, Plywood, Tool handles, Toys, Rotary Veneer, Workbenches, Upholstery frames

Beech is used extensively for any kind of interior application. It dresses very smooth, sands to a high polish and takes particularly any type of finish well.

Beech is a hard, strong and heavy close-grained hardwood. Its fine texture makes it an ideal wood for domestic flooring. Beech is especially wear resistant, making it appropriate for heavy-duty economical flooring and staircase construction as well. Its excellent shaping and turning properties make it an excellent wood for brushes and handles, stair balusters and railings and other turned and shaped woodenware.

Beech is a good toy wood because of its non-toxic qualities and its lack of any tendency to splinter on corners of square toys. Its unique spine, a combination of strength, stiffness and hardness adapts to the manufacture of slim, delicate turnings with high-strength requirements, such as veneers, chairs, upholstery frames and dowels.

Beech is not difficult to machine although it is very strong and hard and quite heavy. It is one of the few hardwoods that is available in good quantity, and up to now, has suffered more from lack of knowledge of its excellent physical properties and possible uses than from any deficiency.

It has long been forced to masquerade in various wood product assemblies under the identity of other hardwoods due to lack of knowledge of Beech as an all-purpose hardwood.

It is considered to be among the best known and most useful commercial timber in the world, and is always in demand. European beech is available in various lengths, wide boards and in the form of veneers. European Beech is moderately priced.



## Physical and technical profile:

### Environmental Profile

#### Distribution

A native of Western Europe, this species is reported to grow throughout Europe, approximately between latitudes 40 degrees N and 60 degrees N, and western Asia. European beech is reported to thrive exceptionally well on chalky limestone hills, but will also do very well on any reasonably fertile light soil, with good drainage.

#### Tree Data

Beech trees are sometimes called “Queen of the Woods” because of their large size and stately appearance. On deep limey soils, the trees are reported to commonly reach 100 feet (30 m), sometimes reaching 150 feet (45 m). Trunk diameters are often 4 feet (1.2 m), but may be greater.

### Physical Profile:

#### Colour

Sapwood and heartwood are usually difficult to differentiate. Freshly-cut European beech is whitish to very pale brown in colour, but exposure darkens it to pale reddish-brown. For the European Beech inhomogeneous, discoloured red heartwood (red core) is very common. The reasons for this “false heartwood” are not yet scientifically proofed.

It is a common practice to steam beech in the green condition, which changes the colour permanently to light red.

#### Grain and Texture

Grain is typically straight, and broad rays are reported to be conspicuous on longitudinal surfaces. The wood is fairly hard and has a fine and even texture.

#### Odour

There is no distinct odour or taste.

#### Ease of Drying

The timber is reported to dry well at a moderate rate, and requires care in air-seasoning and kiln-drying to prevent excessive shrinkage.

Shrinkage Green to 12% MC

Radial = 4.5%

Tangential = 9.5%

#### Drying Defects

The wood is reported to have moderate refractory properties and has a tendency to check, split, and distort during drying. Shrinkage can also be very substantial. Here at Abalon Hardwood we have developed a drying process designed to minimise these disadvantages. Our lumber is known for its careful drying and even moisture content.

#### Movement in Service

The timber is reported to have mediocre dimensional stability. It tends to exhibit rather large movement in use, and requires careful and proper seasoning before application. Abalon Beech is carefully seasoned and conditioned to a degree of humidity between 8 % and 10 %, ensuring stableness and very low tension of the wood.



#### Natural durability and resistance to impregnation

European beech is reported to have little natural resistance to attack by decay fungi and other wood destroying insects. However the timber is reported to absorb preservatives better than many hardwoods.

#### Variability in Properties

European beech is widely distributed across Europe and western Asia and can vary in strength and machining properties, according to prevailing conditions and locality of growth.

#### Cutting Resistance

Resistance to cutting is rated as moderate, but saws may bind during conversion of green material. Burning and tooth vibration may also occur when cross-cutting tougher material. Narrow bandsawing is reported to be satisfactory.

#### Planing

Planing properties vary, but are reported to be generally satisfactory. A reduced cutting angle of 30 degrees has been recommended in planing. Abalon Beech is knife-planed (not sanded), making disguised faults become visible. Only then the timber is graded subject to our demanding quality criteria.

#### Turning

European beech is reported to be a very good turnery wood.

#### Boring and Nailing

Charring is reported to be common during boring operations. The timber is fairly hard and moderately heavy and requires pre-boring.

#### Gluing

The timber is reported to glue well.

#### Polishing

Polishing characteristics are reported to be very good.

#### Staining

The timber is reported to take stains very well, and can be dyed readily for purposes where coloured wood is required.

#### Response to Hand Tools

Seasoned wood is reported to be rather difficult to work with hand tools.

#### Steam Bending

European beech is reported to have exceptional steam bending properties, even when knots and irregular grain are present. It can be bent to very small radii, which makes it particularly useful in the furniture industry.

#### Strength Properties

The bending strength qualities of this species in the air-dry condition is very high, far superior to those of Mahogany. Compression strength parallel to grain in the air-dry condition is high. Teak, White oak and Hard maple have high crushing strength. It is fairly hard, resisting wear, denting, and marring fairly well.



### Physical properties:

Physical properties *Fagus sylvatica L.* (metric)

Category	Green	Dry (8-10%)	Unit
Specific gravity	1,07	0,72	[g/cm <sup>3</sup> ]
Compressive strength Sigma dB		62	[N/mm <sup>2</sup> ]
Tensile strength Sigma dB		135	[N/mm <sup>2</sup> ]
Bending strength Sigma dB		123	[N/mm <sup>2</sup> ]
Modulus of elasticity (bending)		14000	[N/mm <sup>2</sup> ]
Hardness (Brinell)		72	[N/mm <sup>2</sup> ]
Shearing strength		10.0	[N/mm <sup>2</sup> ]

Source: [http://www.holz.de/holzartenlexikon/de\\_zeigephysik.cfm?HolzartenID=267](http://www.holz.de/holzartenlexikon/de_zeigephysik.cfm?HolzartenID=267)

Physical properties *Fagus sylvatica L.* (imperial)

Category	Green	Dry	Unit
Specific gravity	52	45	[Lbs/cu.ft.]
Bending Strength	8930	16245	[psi]
Max. Crushing Strength	3850	7843	[psi]
Impact Strength	36	45	[inches]
Stiffness	1520	1958	[1000 psi]
Work to Maximum Load	13	17	[in-lbs/in <sup>3</sup> ]
Hardness		1440	[lbs]
Shearing Strength		2024	[psi]

Source: Forest Products Export Directory, 25<sup>th</sup> Edition